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2004 WATERFOWL HARVEST SURVEY

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ABSTRACT

A sample of waterfowl license buyers was contacted after the 2004 hunting seasons to estimate the number of people hunting waterfowl, their days afield, and harvest. In 2004, about 61,000 people hunted waterfowl. The number of people hunting waterfowl was nearly unchanged from 2003. However, the number of duck hunters has declined about 60% since the mid-1950s, and goose hunter numbers were about 20% lower than numbers in the 1950s. Nearly 50% of both duck and goose hunters were satisfied with their waterfowl hunting experience in 2004. Nearly equal proportions of duck and goose hunters (40%) reported their satisfaction with waterfowl hunting had decreased or remained unchanged during the last three years. About 50% of duck hunters were satisfied with the 2004 duck hunting season dates, length of the duck season, and the daily duck limit. However, 24-33% of the duck hunters reported they were satisfied with the number of ducks seen and ducks harvested in 2004. Similarly, about 28% of goose hunters were satisfied with the number of geese harvested in 2004, but unlike duck hunters, nearly 50% of goose hunters were satisfied with the number of geese seen.

INTRODUCTION

The Michigan Department of Natural Resources (DNR) has the authority and responsibility to protect and manage the wildlife resources of the State of Michigan. This responsibility is shared with the U.S. Fish and Wildlife Service (USFWS) for the management of migratory species such as ducks (Anatinae) and geese (*Branta* and *Anser* spp.). Harvest surveys are one of the management tools used by the Wildlife Division to accomplish its statutory responsibility. Estimating harvest and hunting effort are among the primary objectives of these surveys. Estimates derived from harvest surveys, as well as breeding bird counts and

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population modeling, are used to monitor game populations and establish harvest regulations.

Waterfowl could be harvested during hunting seasons that occurred between September 1, 2004, through January 30, 2005, (Table 1) by a person possessing both a waterfowl and a small game hunting license (includes resident, nonresident, 3-day nonresident, resident junior, and senior small game hunting licenses). Waterfowl hunters also had to obtain a federal waterfowl stamp and to register with the National Migratory Bird Harvest Information Program (HIP). Hunters younger than 16 years of age could hunt waterfowl without a waterfowl hunting license or a federal waterfowl stamp; however, they still were required to purchase a small game license and register with HIP.

HIP is a cooperative effort between state wildlife agencies and the USFWS. It was implemented to improve knowledge about harvest of migratory game birds (e.g., ducks and geese). Beginning in 1995, any person who hunted migratory game birds in Michigan was required to register with HIP and answer several questions about their hunting experience during the previous year. HIP provided the USFWS with a national registry of migratory bird hunters from which they can select participants for harvest surveys.

The USFWS sets overall hunting season frameworks (i.e., number of days of hunting and bag limits) for migratory birds, but state wildlife agencies select specific regulations such as season dates within those frameworks. Both waterfowl population status and hunter attitudes are used when developing waterfowl hunting regulations. Although estimating harvest, hunter numbers, and hunting effort were the primary objectives of the waterfowl harvest survey, this survey also provided an opportunity to collect information about management issues. Questions were added to the questionnaire to estimate hunters' opinions and satisfaction with hunting regulations and waterfowl numbers.

METHODS

Following the 2004 hunting seasons, a questionnaire was sent to 4,990 randomly selected people that had purchased a waterfowl hunting license. All licensees had an equal chance of being included in the random sample. After the sample was selected, licensees were grouped into 1 of 4 strata on the basis of their residence. Residents of the Upper Peninsula (UP), northern Lower Peninsula (NLP), southern Lower Peninsula (SLP), and nonresidents were grouped into separate strata (Figure 1). Up to two follow-up questionnaires were sent to non-respondents. Questionnaires were undeliverable to 89 people, primarily because of changes in residence. Questionnaires were returned by 3,065 of 4,901 people receiving the questionnaire (63% response rate).

Estimates were calculated using a stratified random sampling design (Cochran 1977). Using stratification, hunters were placed into similar groups (strata) based on county of residence, and then estimates were derived for each group separately. The statewide estimate was then derived by combining group estimates so the influence of each group matched the frequency that its members occurred in the statewide population of hunters. The primary reason for using a stratified sampling design was to produce more precise estimates.

Improved precision means that similar estimates should be obtained if this survey were to be repeated.

Estimates were calculated along with their 95% confidence limit (CL). In theory, this confidence limit can be added and subtracted from the estimate to calculate the 95% confidence interval. The confidence interval is a measure of the precision associated with the estimate and implies the true value would be within this interval 95 times out of 100. Unfortunately, there are several other possible sources of error in surveys that are probably more serious than theoretical calculations of sampling error. They include failure of participants to provide answers (nonresponse bias), question wording, and question order. It is very difficult to measure these biases. Thus, estimates were not adjusted for possible bias. Furthermore, harvest estimates did not include animals taken legally outside the open season (e.g., nuisance animals).

The survey design used for the 2004 survey differed from the design used in previous waterfowl harvest surveys (Frawley 2004). In previous surveys, unlicensed waterfowl hunters that had obtained a small game hunting license were included in the sample. Because hunters younger than 16 years of age could hunt waterfowl with only a small game hunting license, the sample for 2004 excluded many younger waterfowl hunters. This difference can confound comparisons of estimates made between years. To reduce bias caused by the differences in sampling designs among years, an adjustment was made on the 2004 estimates to make them comparable to estimates from previous years. These adjustments reflected the average difference noted between estimates calculated with and without unlicensed waterfowl hunters in 2002 and 2003 surveys. Most estimates of harvest, hunting effort, and hunter numbers were increased by 10-15% to make estimates comparable. The mean age of hunters in 2004 was reduced 6% to make estimates comparable to previous years.

Statistical tests are used routinely to determine the likelihood that the differences among estimates are larger than expected by chance alone. The overlap of 95% confidence intervals was used to determine whether estimates differed. Non-overlapping 95% confidence intervals was equivalent to stating that the difference between the means was larger than would be expected 995 out of 1,000 times, if the study had been repeated (Payton et al. 2003).

RESULTS AND DISCUSSION

License sales and hunter participation

In 2004, 62,738 people purchased a waterfowl hunting license (Table 2). The average age of people that purchased a waterfowl hunting license was 41 years (Figure 2). About 1% (894) of waterfowl license buyers were younger than 17 years old, although hunters 12-15 years of age could legally hunt waterfowl without a waterfowl hunting license. An estimated 58,422 people actually hunted waterfowl in 2004 (Table 3). About 98% of the waterfowl hunters were males.

Harvest and hunting trends

The differences between the number of waterfowl hunters and hunting effort (days afield) between 2003 and 2004 were not significantly different for most hunting seasons (Tables 4 and 5). The only season to experience a significant decline in both the number of hunters and hunting effort was the late duck hunting season in the Lower Peninsula. Hunter numbers declined statewide for the late goose season, and hunting effort declined during the regular goose season in the Upper Peninsula.

Although harvest declined for all waterfowl hunting seasons, the only waterfowl hunting season that experienced a significant decline in harvest between 2003 and 2004 was the regular goose season (Table 6). Michigan was offered a longer regular goose season within the Mississippi Valley Population goose harvest zone in 2003 compared to other recent years and this may explain the high regular season harvest in 2003. The USFWS (2005) reported a nonsignificant decline in duck hunter numbers, duck hunting effort and harvest in Michigan between 2003 and 2004 (all duck seasons combined). However, they reported a significant decline in goose hunters, goose hunting effort, and harvest between 2003 and 2004 (all goose seasons combined).

Michigan's goose harvest usually consists of nearly all Canada geese (*Branta canadensis*) (USFWS 2005). During recent years, about 80% of the goose harvest was considered resident Canada geese based on band recoveries (Tim Moser, USFWS, unpublished data). Numbers of giant Canada geese in Michigan have been declining since 2000 and have been slightly below the desired level of 175,000-225,000 geese as measured by spring surveys (David Luukkonen, Michigan DNR, unpublished data).

The number of people hunting ducks during the regular season has declined about 60% since the mid-1950s; however, the number of goose hunters in the 2004 regular season was only 20% lower than the numbers reported during the 1950s. Although the number of duck hunters and duck harvest has decreased since 1970 (Figure 3), duck harvest per day of hunting effort has increased (Figure 4). Goose harvest and the mean number of geese taken per day of hunting effort also have increased gradually since the 1970s (Figure 4).

Hunter opinions

An estimated 46% of the Michigan duck hunters were satisfied with their duck hunting experience in 2004, 23% had a neutral opinion about their experience, while 28% of duck hunters were dissatisfied (Table 7). Satisfaction among goose hunters with the goose hunting seasons was similar to the satisfaction levels reported for duck hunting. Nearly equal proportions of both duck and goose hunters (40%) reported their satisfaction with waterfowl hunting had decreased or remained unchanged during the last three years (Tables 8 and 9).

Opinions of Michigan duck hunters were similar to those of hunters from Michigan, Minnesota, and Wisconsin combined. During fall 2005, 42% of duck hunters in these three states were satisfied with their duck hunting experience during the previous year (National Flyway Council and Wildlife Management Institute 2006). Nearly 20% of these duck hunters had a neutral opinion about their experience while 38% of were dissatisfied. In addition, 10% of these duck hunters from these three states reported that the quality of duck hunting had

improved over the past five years. In contrast, 22% of duck hunters stated that the quality of duck hunting was about the same, 66% reported a decline, and 3% had no opinion.

Nearly 50% of Michigan duck hunters were satisfied with the 2004 duck hunting season dates, length of the duck season, and the daily duck limit (Table 7). However, nearly 50% of the duck hunters reported they were dissatisfied with the number of ducks seen and ducks harvested in 2004. Similarly, about 50% of goose hunters were dissatisfied with the number of geese harvested in 2004, but unlike duck hunters, nearly 50% of goose hunters were satisfied with the number of geese seen.

Generally, Michigan duck hunters were more satisfied with the duck hunting season dates, length of the duck season, and the daily duck limit than duck hunters from Michigan, Minnesota, and Wisconsin combined (National Flyway Council and Wildlife Management Institute 2006). For comparison, 23% of the duck hunters in these three states reported that they were satisfied with the timing of the duck season, 32% were satisfied with the number of days in the season, and 40% were satisfied with the number of ducks in the daily limit.

Nearly equal proportions of Michigan duck hunters (31%) preferred the maximum daily limit for mallards set to 4 or 5 birds (Table 10). Moreover, nearly equal proportions of duck hunters (34-38%) preferred the maximum daily limit for hen mallards be set to 1 or 2 hens, while only 7% of duck hunters favored a 3-hen limit (Table 11). For comparison, 54% of the duck hunters from Michigan, Minnesota, and Wisconsin combined reported that the daily bag limit for hen mallards should be one hen, while 33% desired a 2-hen bag limit (National Flyway Council and Wildlife Management Institute 2006).

Nearly 50% of Michigan duck hunters reported the length of the duck hunting season (60 days) during the last three years was about right (Table 12). In contrast, about 22% of duck hunters preferred a longer season and 6% preferred a shorter season. For comparison, 63% of the duck hunters in Michigan, Minnesota, and Wisconsin combined reported during fall 2005 that duck seasons over the previous five years were about the right length (National Flyway Council and Wildlife Management Institute 2006).

About 55% of duck hunters indicated the maximum length for the duck hunting season should be 60 days (Table 13). An estimated 45% of duck hunters reported they would continue to hunt ducks regardless of the length of the season (Table 14). However, 24% of the duck hunters active in 2004 reported they would stop hunting if the season was shortened to 30 days or less.

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Table 1. Waterfowl hunting seasons in Michigan, 2004-2005.

Species, season, and area[a]	Season dates
Ducks[b]	
North Zone (UP)	Sept. 25 – Nov. 21 and Nov. 27 – 28
Middle Zone (NLP)	Oct. 2 – Nov. 28 and Jan. 1 – 2
South Zone (SLP)	Oct. 9 – Dec. 5 and Jan. 1 – 2
Canada geese[b,c]	
Early seasons	
Upper Peninsula	Sept. 1 – 10
Lower Peninsula	Sept. 1 – 15
Regular season	
Statewide	Sept. 20 – Oct. 10 and Dec. 4 – 12
Late season	
Southern Lower Peninsula	Jan. 1 – 30

[a]See Figure 1 for boundaries of hunt areas.
[b]Ducks and geese could also be taken during a special 2-day Youth Season (September 18-19).
[c]Special goose hunting seasons also occurred on Goose Management Units, but these seasons affected a relatively small area.

Table 2. Number of waterfowl hunting licenses sold, 2000-2004.

Item	Year					2003-2004 % Change
	2000	2001	2002	2003	2004	
Number of licenses sold[a]	66,583	66,472	65,050	65,457	63,320	-3.3
Number of people buying a hunting license[b,c]	66,115	65,966	64,582	65,024	62,738	-3.5

[a]The number of licenses sold is higher than the number of people buying licenses because some people purchased multiple licenses.
[b]A person was counted only once, regardless of how many licenses they purchased.
[c]Hunters 12-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

Table 3. Estimated sex and age of waterfowl hunters in Michigan, 2000-2004.[a]

Hunters	2000	2001	2002	2003	2004	
					Estimate	95% CL
Waterfowl[b]	60,767	63,966	58,944	60,805	58,422	1,039
Males (%)	97.8	98.0	97.8	97.5	98.2	1.0
Females (%)	2.2	2.0	2.2	2.5	1.8	1.0
Age (Years)[c]	38.5	38.3	39.2	39.7	39.6	0.5

[a]Analyses included only those people that hunted.
[b]People that hunted ducks or geese.
[c]The mean age was incorrectly reported for 2002 and 2003 in previous annual reports (Frawley 2003, 2004). Hunters 12-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

Table 4. Estimated number of waterfowl hunters by season and region in Michigan, 2001-2004.[a]

Species	2001	2002	2003	2004 No.	2004 95% CL	2003-2004 % Change
Ducks (Regular season)						
UP	6,293	6,644	7,295	7,987	689	9
NLP	19,615	19,126	19,086	19,788	987	4
SLP	31,734	27,152	28,278	27,831	1,087	-2
Statewide	51,908	47,277	48,992	48,881	1,181	<1
Ducks (Late season)						
UP						
NLP	875	2,119	2,357	1,652	355	-30
SLP	9,150	8,927	9,777	8,011	753	-18*
Statewide	10,003	10,916	12,096	9,618	827	-20*
Geese (Early season)						
UP	2,177	1,964	2,600	2,484	409	-4
NLP	7,924	7,756	7,558	7,865	702	4
SLP	19,251	17,219	16,088	15,844	979	-2
Statewide	28,352	26,123	25,474	25,216	1,181	-1
Geese (Regular season)						
UP	3,869	3,381	4,859	4,019	479	-17
NLP	9,629	8,277	10,775	9,694	760	-10
SLP	16,673	13,442	15,895	16,246	983	2
Statewide	28,907	24,206	30,171	28,815	1,214	-4
Geese (Late season)						
UP						
NLP	1,041	984	1,043	605	217	-42
SLP	12,283	9,682	9,408	8,141	748	-13
Statewide	13,190	10,526	10,373	8,687	784	-16*

[a]The number of hunters does not add up to the statewide total because hunters can hunt in more than one region.
*Non-overlapping 95% confidence intervals indicated estimates differed significantly (P<0.005).

Table 5. Estimated amount of waterfowl hunter effort (days afield) by season and region, 2001-2004.

Species	2001	2002	2003	2004 No.	2004 95% CL	2003-2004 % Change
Ducks (Regular season)						
UP	37,721	38,871	49,500	50,977	6,656	3
NLP	125,364	119,508	125,430	140,167	12,272	12
SLP	211,935	168,292	184,763	198,688	13,835	8
Statewide	375,020	326,671	359,693	389,831	19,520	8
Ducks (Late season)						
UP						
NLP	1,356	3,397	3,802	2,591	589	-32
SLP	14,864	13,397	14,708	12,577	1,300	-14
Statewide	16,220	16,794	18,510	15,167	1,424	-18*
Geese (Early season)						
UP	8,513	7,898	9,933	9,014	1,886	-9
NLP	32,953	31,276	28,020	31,670	3,652	13
SLP	79,788	70,166	64,401	63,975	5,533	-1
Statewide	121,254	109,340	102,355	104,659	6,928	2
Geese (Regular season)						
UP	16,520	14,813	30,456	21,899	3,464	-28*
NLP	45,666	40,607	52,377	48,667	5,890	-7
SLP	62,621	53,929	69,092	72,173	6,754	4
Statewide	124,807	109,348	151,925	142,739	9,561	-6
Geese (Late season)						
UP						
NLP	3,403	3,276	2,794	2,975	1,431	6
SLP	48,923	36,439	34,390	31,215	5,417	-9
Statewide	52,326	39,715	37,184	34,190	5,678	-8

*Non-overlapping 95% confidence intervals indicated estimates differed significantly (P<0.005).

Table 6. Estimated waterfowl harvest by season and region in Michigan, 2001-2004.

Species	2001	2002	2003	2004 No.	2004 95% CL	2003-2004 % Change
Ducks (Regular season)						
UP	39,105	61,573	55,296	44,098	7,229	-20
NLP	154,453	149,864	163,060	137,856	16,754	-15
SLP	226,820	191,924	210,061	190,955	18,630	-9
Statewide	420,378	403,361	428,417	372,908	26,485	-13
Ducks (Late season)						
UP						
NLP	1,643	5,472	5,772	3,415	1,187	-41
SLP	25,969	19,684	19,210	19,121	2,959	<1
Statewide	27,611	25,156	24,982	22,536	3,185	-10
Geese (Early season)						
UP	5,885	7,942	10,444	6,347	1,833	-39
NLP	24,495	26,366	22,619	23,587	4,678	4
SLP	69,247	60,208	59,135	57,237	7,269	-3
Statewide	99,627	94,516	92,198	87,171	8,977	-5
Geese (Regular season)						
UP	8,053	8,090	23,667	9,264	2,081	-61*
NLP	18,055	19,270	24,658	21,950	3,465	-11
SLP	33,278	28,164	34,034	35,710	4,412	5
Statewide	59,385	55,524	82,359	66,924	5,971	-19*
Geese (Late season)						
UP						
NLP	1,624	1,945	2,246	2,510	2,324	12
SLP	33,359	23,399	26,497	17,663	3,680	-33
Statewide	34,983	25,344	28,743	20,174	4,355	-30

*Non-overlapping 95% confidence intervals indicated estimates differed significantly (P<0.005).

Table 7. Level of satisfaction among waterfowl hunters with the 2004-2005 waterfowl hunting seasons and hunting regulations in Michigan (summarized as the proportion of active waterfowl hunters reporting various levels of satisfaction).

	Level of satisfaction							
	Very satisfied or somewhat satisfied		Neutral		Somewhat dissatisfied or strongly dissatisfied		No answer	
Hunting experience or regulation	%	95% CL	%	95% CL	%	95% CL	%	95% CL
Days hunted ducks	39	2	27	2	32	2	1	1
Ducks seen	33	2	19	2	47	2	1	<1
Ducks harvested	24	2	23	2	51	2	2	1
Days hunted geese	34	2	28	2	34	2	5	1
Geese seen	48	2	19	2	32	2	2	1
Geese harvested	28	2	22	2	48	2	3	1
Duck hunting experience	46	2	23	2	28	2	3	1
Goose hunting experience	43	2	24	2	29	2	3	1
Duck season dates	46	2	25	2	26	2	3	1
Length of duck season	52	2	25	2	20	2	3	1
Daily duck limit	58	2	28	2	12	1	2	1

Table 8. Change in duck hunter satisfaction during the last three duck hunting seasons in Michigan (summarized as the proportion of duck hunters active in 2004 reporting various levels of satisfaction).

	Active duck hunters			
Change in satisfaction	%	95% CL	Number	95% CL
Greatly increased	1	<1	756	236
Increased	11	1	5,529	614
No change	40	2	16,373	952
Decreased	30	2	14,665	916
Greatly decreased	9	1	4,177	540
No answer	9	1	1,370	317

Table 9. Change in goose hunter satisfaction during the last three goose hunting seasons in Michigan (summarized as the proportion of goose hunters active in 2004 reporting various levels of satisfaction).

	Active goose hunters			
Change in satisfaction	%	95% CL	Number	95% CL
Greatly increased	4	1	1,251	303
Increased	18	2	6,340	652
No change	37	2	12,702	871
Decreased	26	2	9,005	758
Greatly decreased	12	2	4,173	540
No answer	3	1	983	269

Table 10. Maximum daily limit for mallards preferred by active hunters during the 2004-2005 waterfowl hunting seasons in Michigan (summarized as the proportion of active duck hunters preferring various options).

Maximum daily limit for	Active duck hunters			
mallards	%	95% CL	Number	95% CL
5	31	2	15,023	924
4	31	2	15,320	929
3	15	1	6,284	651
2	4	1	1,515	333
No opinion	14	1	3,724	512
No answer	6	1	1,003	272

Table 11. Maximum daily limit for hen mallards preferred by duck hunters during the 2004-2005 waterfowl hunting seasons in Michigan (summarized as the proportion of active duck hunters preferring various options).

Maximum daily limit for	Active duck hunters			
hen mallards	%	95% CL	Number	95% CL
1	38	2	18,608	988
2	34	2	16,096	946
3	7	1	3,154	473
No opinion	15	1	4,134	538
No answer	6	1	878	254

Table 12. Duck hunter opinion concerning the length of the duck hunting during the past three years in Michigan (summarized as the proportion of active duck hunters reporting various levels of satisfaction).

	Active duck hunters			
Satisfaction with season length	%	95% CL	Number	95% CL
Season length about right	49	2	24,411	1,055
Lengthen season	22	1	10,461	806
Shorten season	6	1	2,454	420
No opinion	16	1	4,458	556
No answer	6	1	1,086	283

Table 13. The maximum length of the duck hunting season preferred by active hunters during the 2004-2005 waterfowl hunting seasons in Michigan (summarized as the proportion of active duck hunters preferring various options).

Maximum season	Active duck hunters			
length	%	95% CL	Number	95% CL
60 days	55	2	26,713	1,070
50 days	9	1	4,386	553
45 days	10	1	4,402	553
No opinion	19	1	6,061	640
No answer	6	1	1,308	309

Table 14. Minimum length of the duck hunting season that would cause hunters to stop hunting ducks in Michigan (summarized as the proportion of active duck hunters preferring various options).

	Active duck hunters			
Season length	%	95% CL	Number	95% CL
50 days	3	1	1,268	305
45 days	7	1	3,293	483
30 days	14	1	6,774	672
20 days	9	1	3,906	523
Will hunt regardless of length	45	2	22,821	1,042
No opinion	16	1	3,846	520
No answer	6	1	962	266

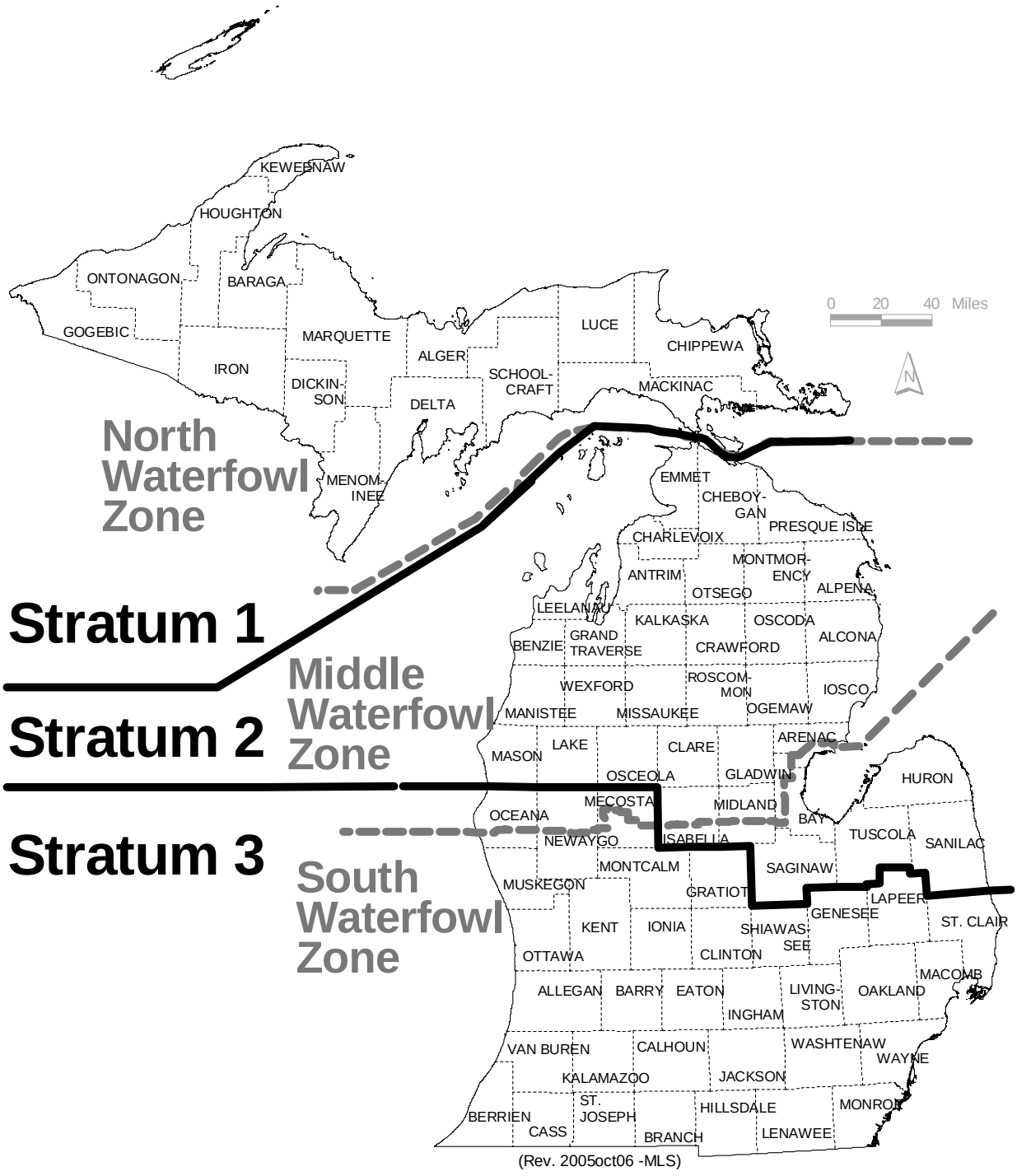

Figure 1. Areas (strata) used to summarize the waterfowl survey data. Stratum boundaries did not match the waterfowl management hunting zones.

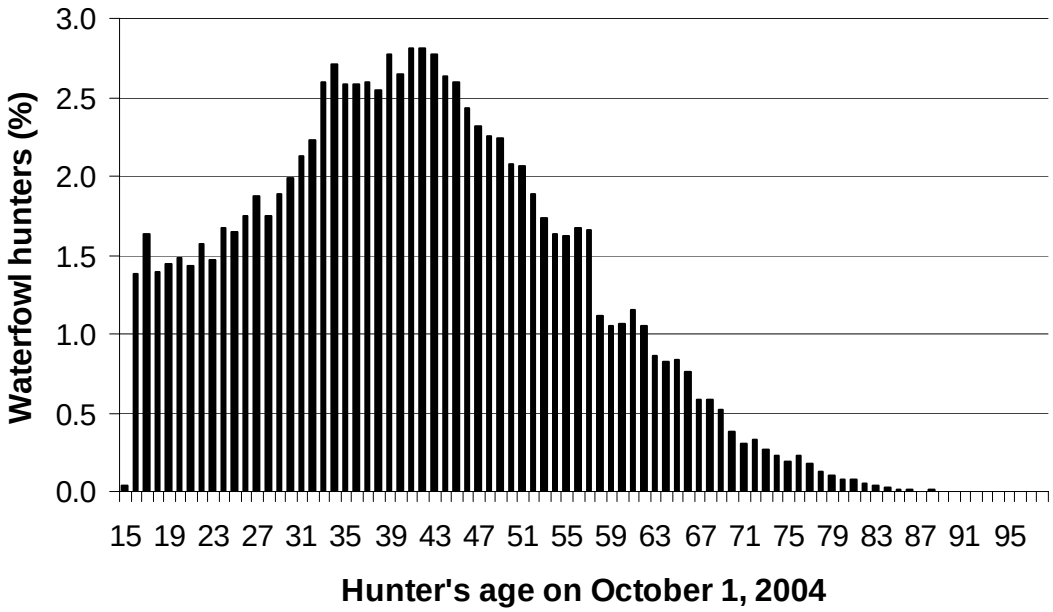

Figure 2. Age of people that purchased a waterfowl hunting license in Michigan for the 2004 hunting seasons ($\bar{x}$ = 41 years). Hunters 12-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

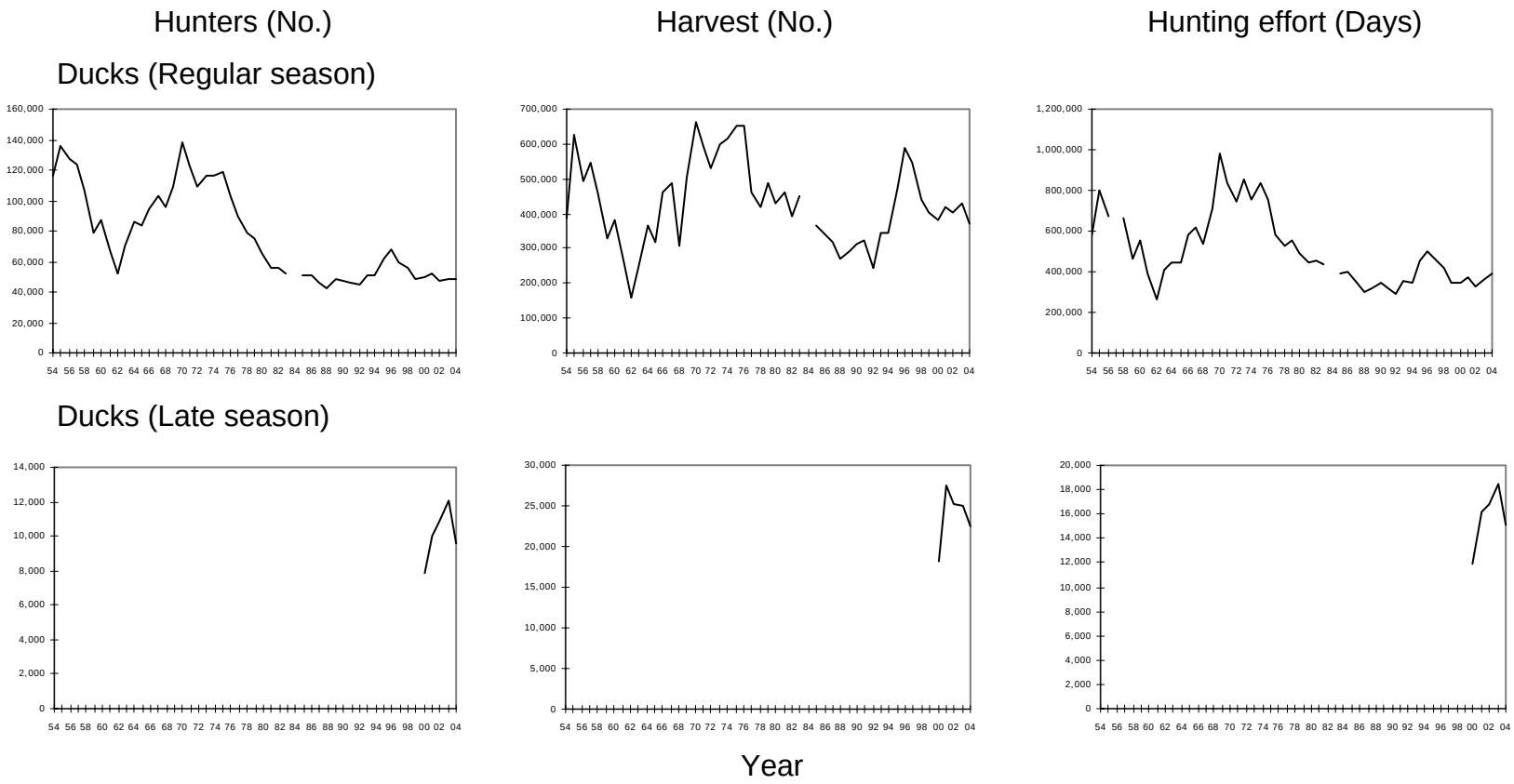

Figure 3. Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2004. No estimates were available or no seasons existed during years when no data are plotted.

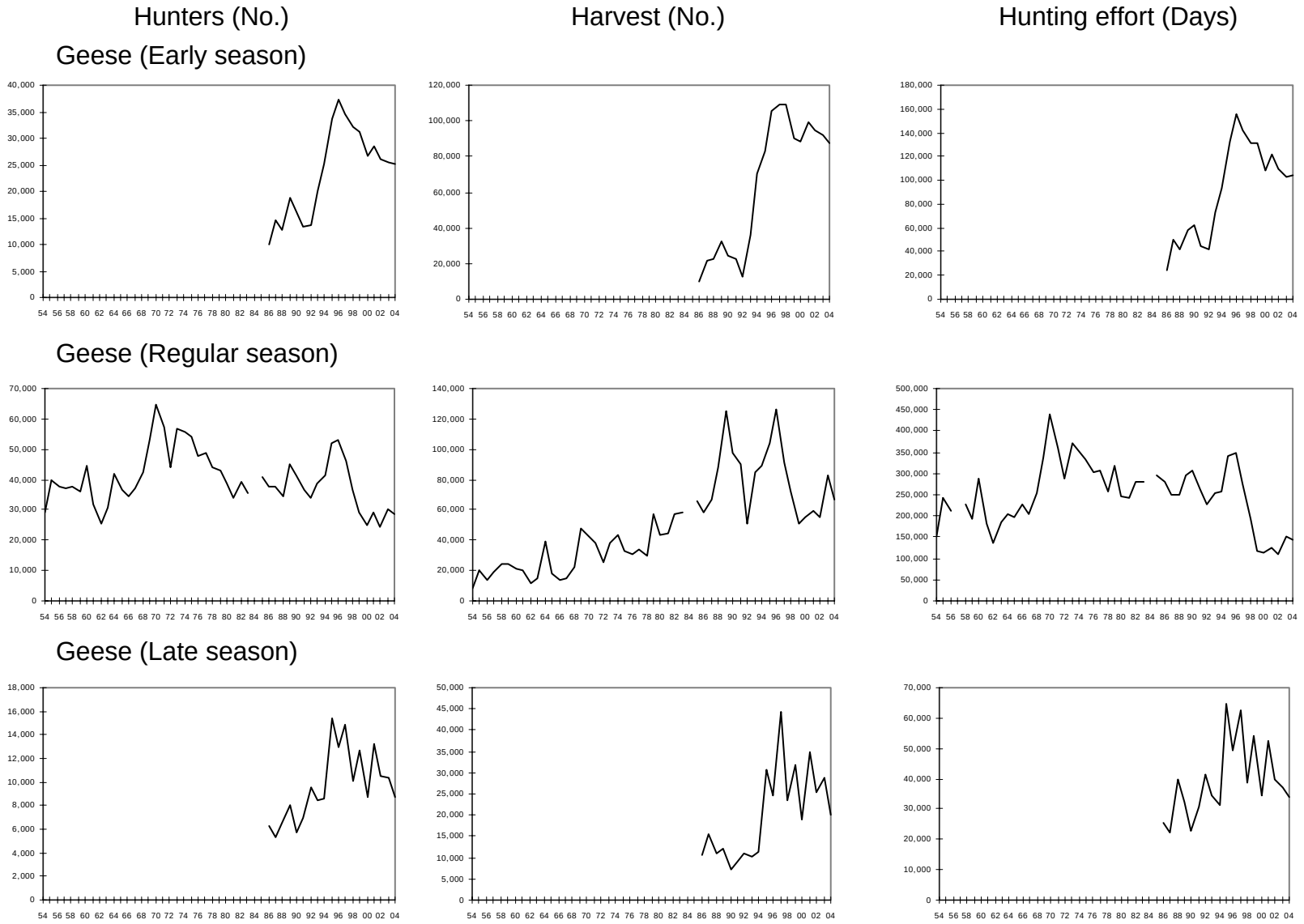

Figure 3 (continued). Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2004. No estimates were available or no seasons existed during years when no data are plotted.

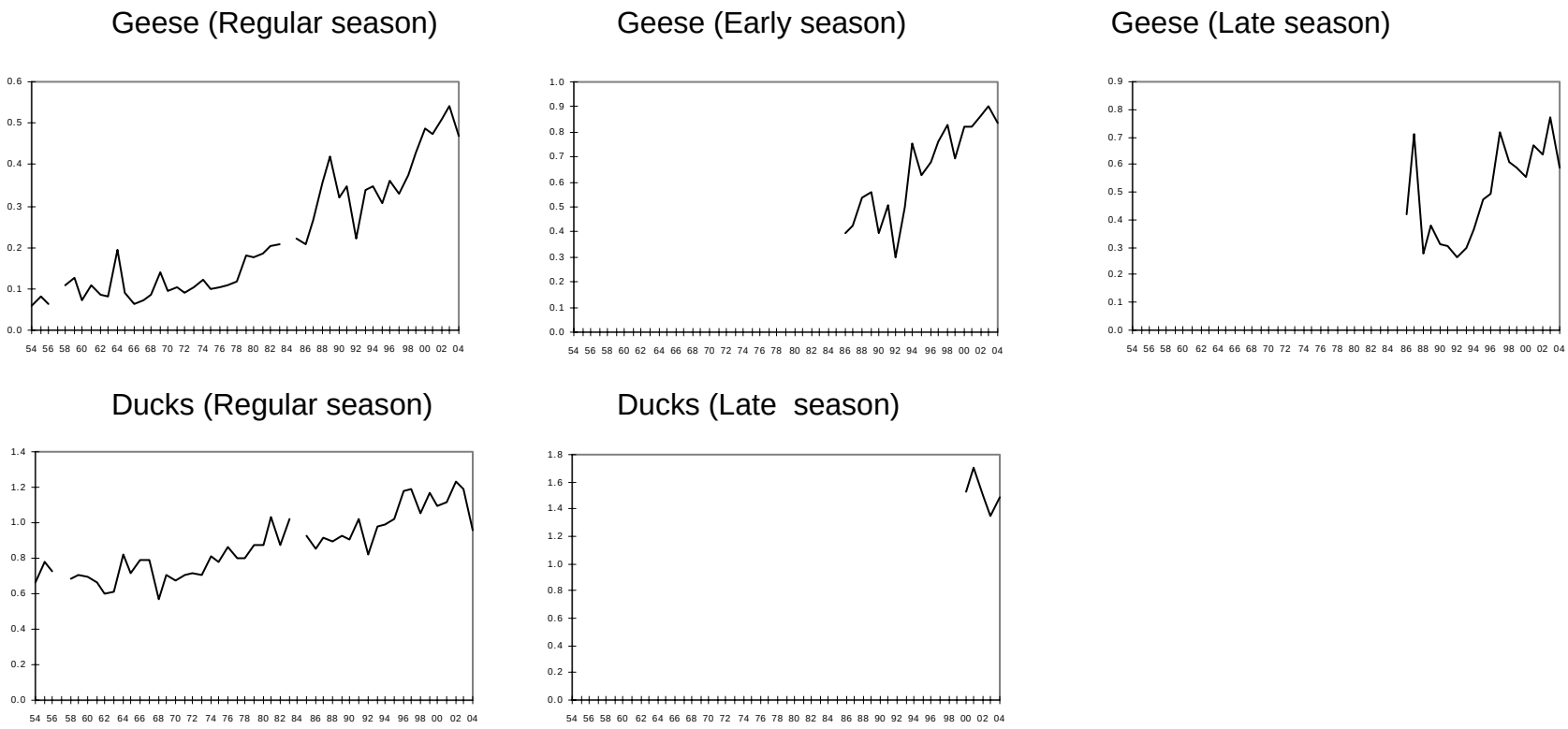

Figure 4. Estimated harvest per effort in Michigan during the waterfowl hunting seasons, 1954-2004. No estimates were available or no seasons existed during years when no data are plotted.